

## Reviews and Bibliographical Notices.

### I.—VULPIAN: \*THE VASO-MOTOR NERVOUS APPARATUS.\*

LECONS SUR L'APPAREIL VASO-MOTEUR (PHYSIOLOGIE ET PATHOLOGIE) Faites à la Faculté de Médecine de Paris. Tome Second. Paris 1875. P. 775. (*Lectures on the Vaso-Motor Apparatus etc.*)

We now approach one of the most important parts of M. Vulpian's work : viz., the relation of the nervous system to congestion. Reference is made to the action of the "depressor" nerves of the heart, in modifying the circulation, in cases of cardiac distension, and increased cardiac pressure, as produced by pulmonary disease, in the small arteries and capillaries, especially in the vascular area comprehended within the cavity of the abdomen, controlled by the splanchnics. This is cited as an example of congestion on a large scale, produced through the agency of the nervous system.

The curious fact is mentioned, first observed by Armand Moreau, that if the splenic artery is ligated, instead of anæmia, congestion follows the operation. The same fact has been observed in respect to the kidney by Prompt. Various attempts to explain this phenomenon have been made, none of them being satisfactory until the one offered by M. Bochefontaine, who ascertained that congestion of the spleen does not follow ligation of the artery, if care is taken not to include in the ligature, any of the nerves accompanying the vessels. The congestion then is due to a retrograde venous fluxion made possible by the severance by the ligature of the vaso-constrictor nerves which accompany the artery, and hence leading to a diminution of vascular tonus in the related splenic vessels.

But without occupying space in a discussion of special instances of congestion arising in consequence of simple excitation or lesions of the vaso-motor nerves, we will pass at once to a statement of the problem which M. Vulpian has set himself to solve. The congestions due to a functional modification of the

(\*Concluded from the last number of the JOURNAL.)

vaso-motor nerves, it is said may be the result, either of a direct or a reflex paralysis of these nerves. M. Vulpian proceeds to a critical examination of these two sorts of congestion.

As regards congestions due to paralysis of the related vaso-motor nerves, the following illustrative example among others is cited: It was observed long since by M. Broca\* that the fall of temperature in a member by the ligature of its principal arterial trunk, is followed in one or two hours, by an elevation of temperature from  $2^{\circ}$  to  $4^{\circ}$  Centigrade. Our author adopts as probably true, the explanation of it given by Brown-Sequard: viz., that it is due to a dilatation of the related vessels by reason of ligation of the vaso-motor nerves accompanying the artery. This operation is followed at first by a deprivation of blood, and hence by a fall in temperature, due to diminished chemico-vital action. But as soon as the collateral circulation has been established, the paralyzed and hence dilated or dilatable vessels, receive more than their normal quantity of blood. In this way the nutritive changes between the blood and tissues are quickened and hence an increase of heat, the production of which depends on the interchanges referred to. This case has been referred to in some detail, for it gives occasion for describing certain important facts and processes, which have a wide range of application. M. Vulpian himself relates many instructive instances of this kind. He also mentions with interest and apparently with approval, the methods of Chapman, of London, of obtaining paralysis of the vaso-constrictors, and hence of producing congestions of different regions of the body by means of the application of ice bags to the spine, and of producing opposite effects, by means of the application of hot water to the same parts.

The vascular dilatation and increase of temperature, which is often observed in hemiplegias depending on intracranial lesions, is discussed, and especially the *tache meningitique*. M. Vulpian agrees to the explanation of the vascular dilatation, which was offered by M. Gubler, that it depends on vaso-motor paresis. But how explain the remarkable increase in the dilatation which follows scratching the skin by means of a blunt point, say the finger nail? Our author regards it as a phenomenon of arrest, or "of a suspension of tonic action of the ganglionic and intramedullary vaso-motor nervous centres, a suspension produced by the excitation of the centripetal fibres, which are in relation with these centres." This suspension of tonic action, is presumed by M. Vulpian, to be the more easily produced as the influence of the higher cerebral centres is cut off from the lower peripheral vaso-motor apparatus, by disease. The susceptibility of the latter is increased, on the same principle as that on which increased reflex activity of the cord de-

\*Broca. *Des aneurysmes et de leur traitement.* Paris, 1856. p. 484 et suiv.

pends, when separated from the brain above. To show that the explanation above given of the phenomena in question, is the one,—that is, that they depend on increased reflex excitability, the complementary fact is mentioned, that electrical irritation of the same parts will lead to the most pronounced appearance of the so-called "goose skin," which depends on contraction instead of dilatation of the cutaneous vessels. We cannot in this place follow the principles developed in this part of M. Vulpian's work, to their practical applications, but we can assure our readers they are numerous and important.

The next group of congestions considered, are those which appear to depend on the action of the vaso-dilator nerves, which M. Vulpian agrees with M. M. Rouget and Bemard, in supposing to act, not on the vessels directly, but on the small ganglion cells—*tonic ganglion cells*—situated on or in the walls of the small muscular vessels, thus diminishing vascular tonus by arrest, or inhibition. Dilatation of the vessels follows as a matter of course. The best known example of this kind of action, is that which is observed, when the chorda-tympani nerve is excited. The excitation of this nerve is followed under ordinary circumstances by immediate and often extreme dilatation of the small arteries of the submaxillary salivary gland, to which gland the nerve is distributed. There is also, (unless the animal is under the influence of atropine) a great increase in secretion of saliva by the gland. A question arose in the course of the researches of M. Vulpian as to whether the vaso-dilators of the glosso-pharyngeal nerve are not derived like those of the chorda tympani, from the fifth nerve. But certain degeneration experiments which he performed, seemed to call for a negative answer. Whether any other nerves of the body contain vaso-dilator fibres M. Vulpian is in doubt, at least so far as experiment goes to show. He has been unable to confirm the statements of M. Claude Bernard, and of Schiff, as to the vaso-dilator action of the auriculo-temporal and other nerves.

M. Vulpian next enters into detailed statements to show how local irritative action may lead to vascular dilatation, or in other words to congestion, of the vessels of the irritated part. This state can be produced though the vaso-dilator nerves, leading to the part, have been divided. After section of the glosso-pharyngeal nerve, friction of the mucous membrane at the base of tongue to which this nerve is distributed, produces marked congestion. Apropos to this case it is said: "According to my view we must admit that the excitation of the glosso-pharyngeal due to friction of the mucous membrane of the tongue, is transmitted by certain of these fibres, either to the ganglions situated on the course of the peripheral part of this nerve, or to those which make part of the nervous plexus, situated about the vessels of the base of the tongue, or in the thickness of their walls, and that this excitation may suspend the activity of these ganglia, and hence of the vaso-constrictors

which proceeded from them, etc." This is essentially the view we have maintained long since, even in the pages of this JOURNAL.

We will place by these passages another extract from the work of M. Vulpian, Vol. II., p. 482. He says:

"In the very beginning of the inflammatory process, even at the moment when it attacks the tissues, an irritation arises in them. The centripetal nerves, sensitive or otherwise, which are involved in this irritation, are excited in a manner more or less violent. These nerves transmit to the small vaso-motor centers an excitation which affects them, and in this way their tonic activity is suspended more or less completely. Hence arises a diminution in tonus of the vessels of the part in which the inflammation arises. This vascular dilatation does not alone affect the small arteries but those which are more voluminous as well."

These views we believe to be in the main correct. But M. Vulpian does not seem to us to have fully or correctly conceived one point in the mechanism by which the so-called idiopathic congestions are produced. He speaks truly of an irritation or excitation of certain centripetal or sensory fibres in the part which is the seat of the congestion, and which nerves transmit impulses to the vaso-motor tonic centers that lie in immediate proximity with the vessels, and so diminish their tonus, and lead in this way to congestion. The point to which we would call attention is this: In idiopathic inflammatory congestions, from what source is the initial irritation? It may be due to the action of some mechanical or chemical irritant. But in many cases this is not true. In our judgment it happens with great frequency that the irritant has a nervous source, as has been occasionally imagined from the time of Prochaska. An irritative—trophic—influence is exerted from a distant source it may be, on the ultimate anatomical elements of the part which is to be the seat of the irritative congestion. Unnatural, irritative action is thus set up, and this, when it is once accomplished, acts, in our opinion, as M. Vulpian supposes, and as we have long since shown.

After having worked out, in his usual luminous manner, the relations, actual and probable, of the nervous system, especially to active or inflammatory congestion, the author passes to many interesting applications in the domain of pathology, such as the congestions connected with neuralgias, the exaggerations of secretion which accompany them; the congestions, cutaneous and otherwise, which occur in the course of fevers, especially intermittent fevers; the relations of the nervous system to the sudoriparous glands; the comparative action of atropine and jaborandi on these glands. M. Vulpian is led to admit, at least hypothetically, the existence of secretory nerves, which pass either to the secreting structure itself for the purpose of exciting it, or to a local nervous apparatus. The action of these nerves may be either exciting or moderating, and M. Vulpian does not think it possible to declare which.

The mechanism by means of which sudden cutaneous congestions occur under emotional influences, is made the subject of interesting remarks. The emotional center, the varying conditions of which may give rise to the congestions referred to, are located, according to M. Vulpian, in the pons varolii. From this point they may exert an influence on various vascular areas, especially the one which includes the face. The influence of the emotion, as it pervades the nervous system, affects the tonic sections of the medullary and spinal vaso-motor centers, so as to produce the temporary congestion. M. Vulpian gives many striking examples of this form of congestion. But we are not yet ready, without the clearest proofs, to admit the pons varolii to be the organic seat of emotion in the sense apparently held by our author. (I. I. 215 sec.)

M. Vulpian is strongly inclined to admit "the existence in the skin, of small departments or vascular territories, more or less independent of each other, each of which is subject to the influence of distinct vaso-motor nerves, or perhaps to that of small peripheral vaso-motor ganglia." (p. 513.)

The author very properly, as it seems to us, believes that this mode of viewing the peripheral vaso-motor apparatuses of the cutaneous surface, may enable us to account for the configuration of various cutaneous eruptions, such as certain so-called rheumatismal exanthems, syphilitic roseola, febrile herpes, herpes zoster, psoriasis, etc., etc.; and not only this, but he holds that these modes of disposition of cutaneous eruptions should teach something inferentially as to the mode of arrangement of the nervous apparatuses of the skin.

Among many other topics discussed is that of visceral lesions following burns of the surface, especially if extensive and severe. These lesions are in the main limited to the gastric and intestinal mucous membrane. M. Vulpian adopts the views of Brown-Sequard as to the mechanism by which the lesions are produced, who believes them to be due to a reflex vaso-motor disorder, accomplished through the agency of the spinal cord.

The mode of occurrence of various non-traumatic hemorrhages is considered in the light of the doctrines previously worked out, of the vaso-motor nervous system. Bloody sweats, such as are described by M. Parrot and others, are believed to be due to a sudden influence exerted from the nervous centers, on the small tonic centers, which constitute the final peripheral vaso-motor apparatus. A sudden dilation of the cutaneous or other vessels occurs, and by a species of diapedesis, the red blood corpuscles appear on or beneath the surface of certain parts of the body. Hæmatidroses usually occurs in highly susceptible, nervous persons.

The nervous mechanism of menstruation and related conditions is described in an interesting and suggestive manner, though the account of it is not carried so far as it may be. But we have discussed these questions at length in an earlier number

of the JOURNAL before the appearance of the work of M. Vulpian.

The hemorrhages which follow lesions of different parts of the cerebro-spinal axis are fully discussed, but no light is thrown on the nature of the final processes on which they depend.

"The influence of the vaso-motors on the inflammatory process," is next considered.

In relation to this subject M. Vulpian says: "It is easy to show that the circulatory modification, determined in a part by the intermediation of its vaso-motor nerves, is not sufficient to provoke the least trace of inflammatory action." And again: "It appears to me incontestable that inflammatory action, in whatever point it may be developed, and whatever may be its cause, is at bottom, altogether independent of the vaso-motor apparatus." These remarks are entirely in accord with views we have long since entertained and taught. The beginning of the inflammatory condition is in an irritative process set up in the intimate texture of the tissues, which has as its cause some agent capable of causing irritation. In the so-called idiopathic inflammations, what can this irritative agent be?

M. Vulpian admits two classes of cases. 1. Those in which the nervous supply of a part has been in some way deranged, and hence its nutrition is impaired. Under these circumstances the part is more liable to take on inflammatory change, from the contact of external agents than if in the normal state. Various causes may kindle in it visible disease, which are not capable of exciting morbid action in healthy parts, and whose action is liable, therefore, to be overlooked. Such parts when once diseased do not heal readily, on account of a loss of trophic or reparative power. 2. Those cases in which the nerves leading to a part are directly or indirectly brought into a state of irritation, and hence produce at one or other of their terminations, a disorder of intimate nutrition in the tissues of the part to which they lead.

The nerves capable of exerting such effects in a peripheral direction are believed by M. Vulpian to be the sensory. Either the nerve trunks themselves or the centres with which they are connected, being in an irritative state, exert an irritative influence on the tissues at their peripheral terminations, and in this way is the irritative action kindled, which is the initial point in the inflammatory process, and in the wake of which the circulatory disorders characteristic of inflammation follow. Chief among the examples given, of the kind of action in question, is that of zona or zoster.

Such in brief are the views of M. Vulpian as to the relations of the nervous system to acute congestions and inflammations. They are almost identical with those we published at length two years since in the first volume of this JOURNAL, in a series of lectures on the "Pathology of the Vaso-Motor Nervous System."

M. Vulpian makes many suggestive practical applications of the doctrine he has worked out in so luminous a manner. He also does not fail to point out the difficulties of his hypothesis; some indeed which do not seem to us fairly to exist. To this portion of the work under consideration we would invite the careful attention of our readers.

(Edema is discussed under various relations, with the design of ascertaining what part the nervous system may have in its production.

The singular experiments of M. Ranvier are described at length, on the artificial production of oedema. Ligation of the principal veins of a limb, or even of the vena cava did not, as might have been expected *a priori*, lead to oedema. This was the result formerly announced by Richard Lower. But if the sciatic nerve should be divided in one limb, after ligation of the vena cava inferior, oedema would come on rapidly in that limb but not its fellow. But neither division of the roots of the nerves in the vertebral canal, nor the spinal cord in the lumbar region, produced such effects as section of the sciatic.

The curious experiment also by M. Ranvier, is next described, in which a manometer was adapted to the duct of Wharton, of the sub-maxillary gland, and then the chorda tympani of the same side was submitted to continuous electrical irritation. This soon caused a great rise of pressure in the duct of Wharton, as shown by the manometer, on account of the rapid accumulation of saliva in the duct and its branches. The circulation in the gland became, as usual in such operations on the chorda tympani, much increased. The irritation of the nerve was maintained for hours, and during this time great oedematous infiltration of the gland occurred.

As regards the results obtained by M. Ranvier, in ligation of the crural vein, M. Vulpian very properly doubts them. He offers cases to the contrary, and calls to his support facts from clinical experience. But he does not deny that the division of the nerves leading to the member, the principal vein to which has been tied, has an influence in diminishing vascular tonus, and hence of favoring the occurrence of oedema, in a way hardly possible not to comprehend. His mode of explaining the oedema of the sub-maxillary gland, as observed by M. Ranvier, does not seem to us wholly, if at all, correct. It is attributed chiefly to increased vascular tension, direct and indirect, whereby exudation of the fluid part of the blood occurs. But it seems to us that the oedema rather results from the extravasation of fluid from the distended radicles of the duct of Wharton, in which the expansive pressure of the contents is so greatly increased, as is shown by the behavior of the manometer. It is a parallel case to that of the hepatic duct, which becomes turgid with bile, on account of temporary closure of the common bile duct, during the existence of duodenal congestion, or inflammation. The intra-hepatic portions of the hepatic duct, become so much dis-

tended with bile as to cause its extravasation into the substance of the liver, and its subsequent absorption into the hepatic vein and its introduction in this way into the general circulation, giving rise to jaundice.

In the case of reflex oedemas, M. Vulpian is inclined to admit in their production an action similar to that by which active congestions and inflammation may be incited.

Passing by his highly suggestive remarks on "Symmetrical gangrene of the extremities," etc., we come to "Migraine." M. Vulpian enters at some length into a statement of the views originally propounded by Dubois Reymond and Moellendorf as to the nature and pathogenesis of this affection. But our readers have so often had accounts of these views in the pages of this JOURNAL as to render a recapitulation at length unnecessary. Suffice it to say, that Dubois Reymond held that the immediate cause of the attack is a contraction of the small peripheral vessels in the region to which the pain is referred. This firm contraction of the muscular tissue of the vessels was supposed by Du Bois to compress small nerve twigs in such way as to cause pain. The disease was described by him under the name of *Hemicrania sympathico-tonica*. The other form, or that described by Moellendorf, consisted in an opposite condition of the vessels, and produced the result (namely, the pain) in a different way: viz., by vascular dilatation. This is the *hemicrania neuro-paralytica* of Moellendorf. These two forms of the disease were traced by the authors mentioned, to opposite conditions of the cervical portions of the sympathetic, both states being abnormal at least in their degree.

M. Vulpian simply rejects the views of Du Bois Reymond, Moellendorf, and others, as to the nature of the disease, and avows that the "mechanism by which the primitive nervous distress is brought about, has wholly escaped recognition." While we reject, and have done so, the views of the above mentioned authors, we do not agree wholly with M. Vulpian, though we cannot now enter on a discussion of this topic, especially seeing that it was made the subject of extended remark in the last number of the JOURNAL.

The last subject considered prior to the discussion of the effects of medicinal agents on the vaso-motor nervous system, is *Exophthalmic goitre*. M. Vulpian enters upon a critical and, as it seems to us, judicious discussion of the pathology of this complex affection, in which he shows rather conclusively that it cannot be a disease of the sympathetic, as so many have been ready to conclude. But he does not himself offer any indication of having arrived at satisfactory views of his own. And this ends the list of pathological cases to the elucidation of which M. Vulpian applies the physiological doctrines which he has won from his study of the mechanism and modes of action of the "vaso-motor apparatus."

The remainder of the volume is given up, as already intimat-

ed, to a study of the action of various medicinal and toxic agents, in the same light.

The action of woorara is discussed at great length, and the conclusion is reached that it acts much more feebly on the vaso-motor than the musculo-motor nervous system. Its action is to enfeeble the vaso-constrictors of the cutaneous surface more particularly, and to augment the temperature of external or superficial parts of the body. But whether this latter result is due simply to an increased activity of circulation in the skin, or to a stimulation of trophic change, it is not possible as yet to decide.

In regard to strychnine the fact first noted perhaps, by Richter, and Meyer, that in poisonous doses its increase in arterial pressure is noted, and the inquiry is made as to how this is brought about. In the first place it is held that either by reason of direct action upon the anatomical elements of the cord and medulla, or by a modification in the circulation of the same parts, there is a decided increase in the reflex excitability of the muscular-motor, and vaso-motor centres of the cord and medulla. This much premised, any centripetal influence which reaches these centres, however slight, may rouse them into inordinate action. In respect to the vaso-motor nervous system, the effect is to increase vascular tonus in most parts of the body, and hence the blood pressure, as already indicated.

Unlike M. Claude Bernard, M. Vulpian, does not believe that strychnia exerts any important action on the sensory nerves.

The various cardiac poisons are next considered, such as digitaline, aconitine, muscarine, etc., including the animal organic cardiac poisons. It is decided in effect that they act chiefly on the peripheral extremities of the vagus, and the intrinsic motor nervous apparatus of the heart, and also the muscular fibre itself to a certain extent. Digitaline, it is decided, acts on the depressor nerves (Ludwig) of the heart, (the cardiac extremities), and by a reflex action in the medulla, thus produces a loss of tonus, in the small muscular vessels; especially does this vascular dilatation occur in the vascular area supplied by the splanchnics, and hence comprehended within the cavity of the abdomen.

The apparent diminution of reflex activity in the cord and medulla, which was found to exist by Weil and Meihuizen, in their experiments with digitaline as shown in frogs, by the slowness of response to excitations, M. Vulpian thinks may not be true. He thinks the slowness in response by reflex movements to excitation, may be due to some change in the striated muscle, to be compared to that produced in the muscular fibre of the heart by the same agent.

But interesting as is the resume in the final lecture by M. Vulpian, concerning the action of various other medicinal substances on the vaso-motor system, we must close our lengthy review of this comparatively remarkable and very readable

work, a rather full and critical survey of which, we have endeavored to convey to our readers.

We have seldom read a work which has proved so interesting and suggestive, and none which has been pervaded by a more admirable spirit. Most happily does Prof. Vulpian combine in his own person, the talents of an investigator and critic of a rare order, and a faculty for lucid exposition almost unrivaled. He has enjoyed splendid opportunities, and has worthily comprehended and improved them. This work alone should place him in the front rank of living physiologists. To us it is no wonder he should have won quite recently, not only the position of Dean of the Faculty of Medicine, but better still, the seat in the Academy of Sciences, at Paris, so long held by Professor Andral, recently deceased.

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## II.—HAMMOND: DISEASES OF THE NERVOUS SYSTEM.

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- A TREATISE ON THE DISEASES OF THE NERVOUS SYSTEM. BY WILLIAM A. HAMMOND, M. D. With one hundred and nine illustrations. Sixth edition, re-written, enlarged and improved. New York, D. Appleton & Co. Chicago, Jansen, McClurg & Co., 1876; 883 pages.

But few American works have succeeded in attracting more attention among the profession abroad than this of Dr. Hammond's. In our own country until quite recently, it has been the only text-book in the hands of practitioners and students, on the subject of which it treats. The author has been peculiarly fortunate not only in imparting a practical turn to his work, but in the time of its publication. It met a felt want, both in our own country and Great Britain, limited as it was in its scope.

It consisted at first, and it still consists, of a series of essays, chiefly on the more common forms of nervous disease, without any preliminary consideration of general principles such as fall within the scope of a critical introductory essay.

Readers of the earlier editions, or rather reprints, will see at once that the work has undergone great changes in almost every part, and has many substantial additions not found in it as at first issued. The fear of rendering the volume too bulky, and the uncertain position, in the nosological scale, of many diseases placed by recent authors as belonging to the nervous system, are among the reasons given by the author for the omission of vari-